

# Steps to an Easier Review and Approval Process for your Structural BMP

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# BMPs in VA – Regs and Specs

- VA SWM Handbook
- Technology-based selection process
- CBPA Regs. Proposed revisions

# Goal of this presentation

- Elements of a successful SWM plan
- Low-cost enhancements, better design approaches, good specifications.

# Steps to a Better SWM plan

- Engage review personnel early
- Logic for BMP site suitability
- Site and BMP context
- Provide narratives, maps and calculations
- Provide solid specifications for BMPs
- Provide low-cost design enhancements

# Engage local review authority in preliminary design



- **BMP Site suitability**
- **Overall local SWM & Regional plans**
- **Local standards or specifications.**
- **Feedback**
- **Tips and suggestions.**

# Benefits of engaging the review authority early in the process

- Project familiarity
- ID “deal-killers”
- Site suitability addressed
- Develops rapport

# Evaluate site suitability for proposed BMPs

- DA Size
- Outfall conditions
- Groundwater constraints
- Wetlands
- Constructability/Maintenance
- Construction phasing
- Local Standards



# Tools for BMP selection

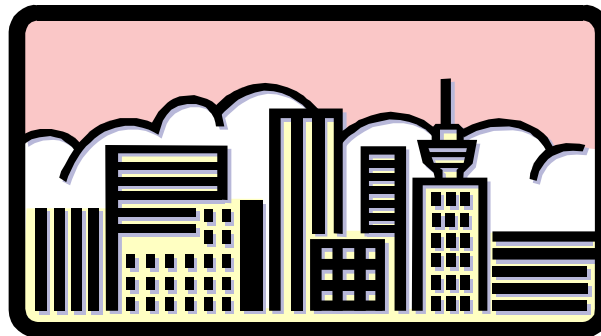
- VA SWM suitability guidelines
- CBLAD BMP selection software
- MWCOC Urban BMP manual
- Local governments reviewers





# Evaluate the site in a greater context

- Compatible with the local SWM master plan?
- Will BMP address existing problems?
- Does BMP accommodate future development?



# Narratives, Maps and Calculations

- Explain approach, strategy and considerations of alternatives
- Pre- and post-development drainage area maps
- Hydrologic/hydraulic calculations
- Water quality calculations
- Assumptions made
- References

# Narratives – Do's

- Orderly, concisely written
- Address all items required by checklists.
- Address site suitability for proposed measures
- Consideration of alternatives.
- Serve as a directory to reviewing the calculations and plan
- Explain overall approach and strategy.
- Should precede a bound set of calculations
- Set the tone for review.
- Anticipate questions and answer them.

# Narratives – Don'ts

- Narratives should not just copied from previous projects
- Provide a stack of information with no guide or TOC
- Leave information out
- Make claims that are unsupported by the plan
- Leave out plan sheet references
- Insert your opinions
- Have inconsistencies with the plan

# VA E&S Handbook – Narratives/Checklists

- E&S Checklist in Handbook, includes narrative elements
- Poor E&S is a major cause of failure for infiltration practices.
- Narrative should be on or with plan.

## CHECKLIST

### FOR EROSION AND SEDIMENT CONTROL PLANS

Minimum Standards - All applicable Minimum Standards must be addressed.

## NARRATIVE

Project description - Briefly describes the nature and purpose of the land-disturbing activity, and the area (acres) to be disturbed.

Existing site conditions - A description of the existing topography, vegetation and drainage.

Adjacent areas - A description of neighboring areas such as streams, lakes, residential areas, roads, etc., which might be affected by the land disturbance.

Off-site areas - Describe any off-site land-disturbing activities that will occur (including borrow sites, waste or surplus areas, etc.). Will any other areas be disturbed?

Soils - A brief description of the soils on the site giving such information as soil name, mapping unit, erodibility, permeability, depth, texture and soil structure.

Critical areas - A description of areas on the site which have potentially serious erosion problems (e.g., steep slopes, channels, wet weather/underground springs, etc.).

Erosion and sediment control measures - A description of the methods which will be used to control erosion and sedimentation on the site. (Controls should meet the specifications in Chapter 3.)

Permanent stabilization - A brief description, including specifications, of how the site will be stabilized after construction is completed.

Stormwater runoff considerations - Will the development site cause an increase in peak runoff rates? Will the increase in runoff cause flooding or channel degradation downstream? Describe the strategy to control stormwater runoff.

Calculations - Detailed calculations for the design of temporary sediment basins, permanent stormwater detention basins, diversions, channels, etc. Include calculations for pre- and post-development runoff.

# Narratives - VA SWM Handbook

**Design and Plan Review Checklist**  
Page 1 of 7

Applicant: \_\_\_\_\_ Phone No.: \_\_\_\_\_  
Designer: \_\_\_\_\_ Phone No.: \_\_\_\_\_  
Project Name: \_\_\_\_\_  
Location: \_\_\_\_\_  
Type of Facility and Identification No.: \_\_\_\_\_

**Plan status:**  
\_\_\_\_ approved  
\_\_\_\_ not approved

**Legend:**    ✓ - Complete  
                  Inc. - Incomplete/Incorrect  
                  N/A - Not Applicable

**I. SUPPORTING DATA**

Narrative describing stormwater management strategy including all assumptions made in the design.

**A. Drainage Area Map**

\_\_\_\_ Site and drainage area boundaries  
\_\_\_\_ Off-site drainage areas  
\_\_\_\_ Pre- and post-developed land uses with corresponding acreage  
\_\_\_\_ Pre- and post-developed time of concentration flow paths  
\_\_\_\_ Existing and proposed topographic features  
\_\_\_\_ Drainage area appropriate for BMP

**B. Soils Investigation**

\_\_\_\_ Soils map with site and drainage area outlined  
\_\_\_\_ Geotechnical report with recommendations and earthwork specifications  
\_\_\_\_ Boring locations  
    \_\_\_\_ Borrow area  
    \_\_\_\_ Basin pool area  
    \_\_\_\_ Embankment area: centerline principal spillway, emergency spillway, abutments  
\_\_\_\_ Boring logs with Unified Soils Classifications, soil descriptions, depth to seasonal high groundwater table, depth to bedrock, etc.  
\_\_\_\_ Compaction requirements specified  
\_\_\_\_ Additional geophysical investigation and recommendations in Karst environment

- Checklists (Ch. 3)

- Design/Review

- Construction/  
Inspection

- Maintenance/  
Operation

# Narratives - Water Quality Impact Assessments

- Reference **all** items in ordinance
- Provide plan sheet numbers where items are addressed
- Supposed to guide the design, not after-the fact
- Describe mitigation measures.

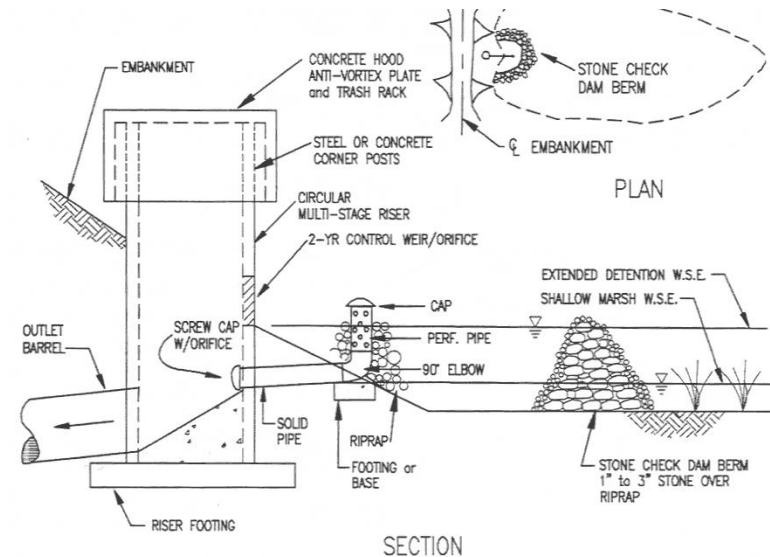
# DA Maps – Important Elements

- DA to points of analysis
- Pre- and post-development
- Time of Concentration flow paths.
- Define site and off-site contributions.
- DA characteristics
- Subareas used in calculations
- Uncluttered, not overlain
- Clear subarea delineation



# Stormwater Calculations

- Provide all inputs and assumptions
- Provide stage-storage-outflow diagram.
- Summary of routings
- Provide routings for 1/2/10/25/100yr
- Sizing Calculations



# Stormwater Quality - Calculations

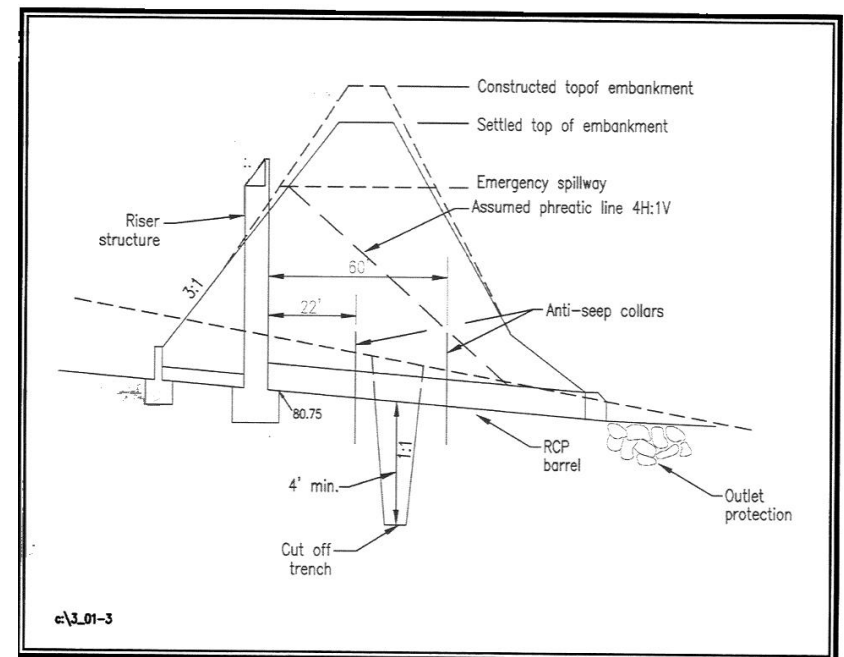
- Pre- and post-development characteristics
- Simple Method analysis
- Treated off-site areas on DA map
- DAs to given BMPs
- Decrease in efficiency of BMPs in series
- Buffer equivalency calculations included.
- Use REASON.

# Water Quality calculations – Essential Elements

- Water quality volume
- WQ storage in BMP
- Drawdown calculations for extended detention (note recommendations in VA SWM Hndbk.)
- Water balance for constructed wetlands.
- Performance-based simple method calculations, or technology based approach discussion

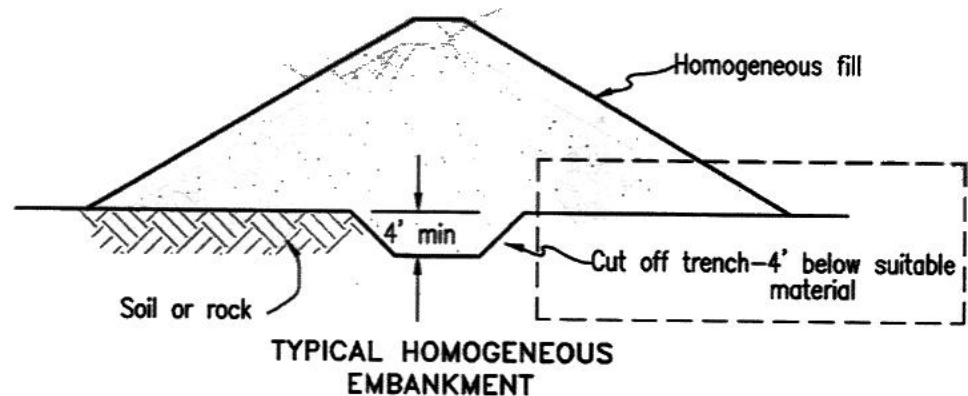
# Specifications for BMPs

- VA SWM Handbook - specifications
- Construction and maintenance specifications
- Phasing of construction



# VA SWM Handbook – BMP Specifications

- Specifications provided for BMP
- Primary outlet structure
- Emergency spillway
- Embankment
- Landscaping



# Good BMP specs

- Details/drawings for all BMP components
- Soil compaction specifications/geotechnical recommendations (embankment and outlet structure)
- Riser structures optimize quantity/quality benefits
- Specifications address tolerances in grading.
- Detailed landscape plan
- Observation wells, cleanouts, etc. for Infiltration BMPs
- Landscape buffers and vegetative practices specs.

# Low-cost BMP Enhancements



- Enhancements to BMP where possible.
- Good selling point
- Required to achieve the cited efficiencies
- Required by SWM Handbook
- Look for enhancement opportunities

# Water Quality - Costs

- Water Quality costs 34-37% of total construction costs of a pond.
- Quantity-only facilities can provide quality benefits at little additional cost.





# Sediment Forebays & Micropools



- Ease of maintenance
- Improves treatment
- Minimal grading required
- Outlet micropool w/inverted outlet pipe

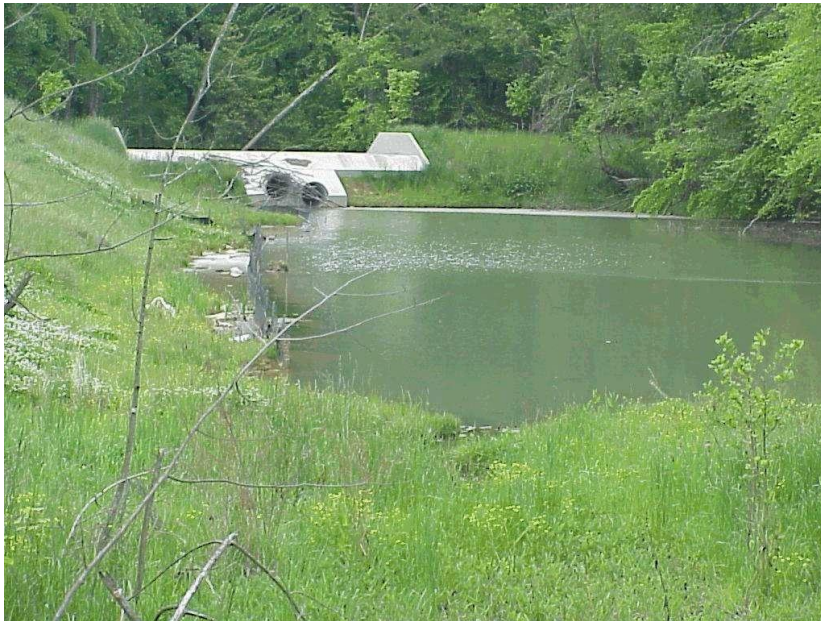
# Vegetated channels

- Vegetated inflow channels filter out large sediment.
- Elimination of piping costs
- Channel shape and size adjustments increase treatment efficiency
- Standards for grassed swales at ASLA web site

<http://www.asla.org/latis/latis03.cfm>



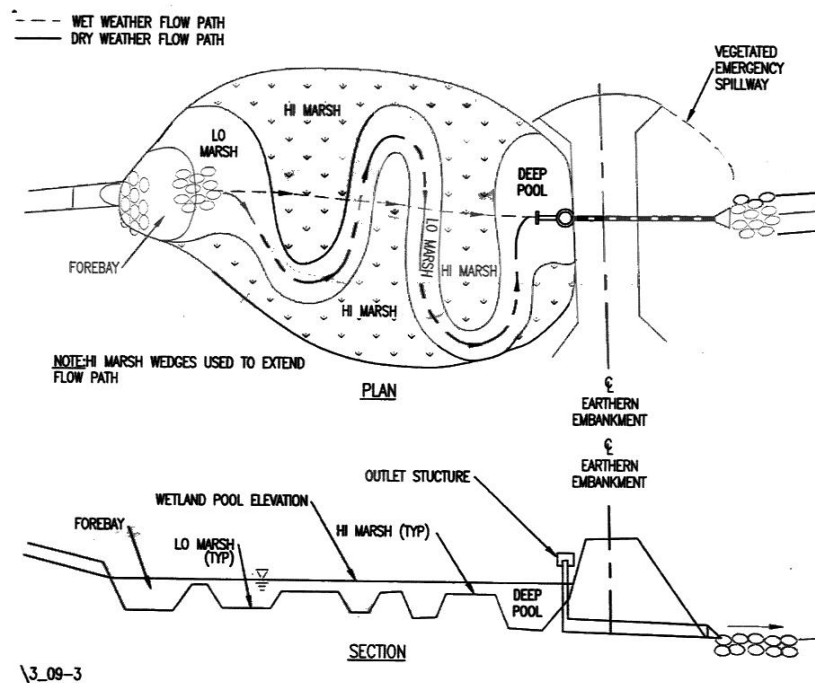
# Aquatic Benches



- Provide for additional treatment
- Wetland vegetation establishment
- Safety concerns (side slopes)
- Provide aesthetic quality to basin
- Help facilitate maintenance



# Flow path concerns



- Timber baffles & soil berms to slow flow, increase treatment efficiency.
- Tend to be low-cost
- Can enhance aesthetic quality
- Prevent short-circuiting
- Increase detention time for small events.
- Inflow points can be adjusted to provide greater dispersion & longer flow path

# Multi-stage risers

- Can be economically viable
- Can assist in lowering the required storage
- They can be optimized to treat specific storm events
- Can increase the overall number of events treated



# Aesthetics Matter



- Use non-geometric shape
- Provide landscaped islands or benches
- A better-looking facility is often better maintained.
- Place the outlet structure in an unobtrusive location with easy access.

# Thanks for listening!

- Copy of presentation is available at <http://www.cblad.state.va.us/swpres500.ppt>
- E-mail: [wbeisch@cblad.state.va.us](mailto:wbeisch@cblad.state.va.us)
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